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Title: Tracking Void Growth in Material Undergoing Tensile Loading

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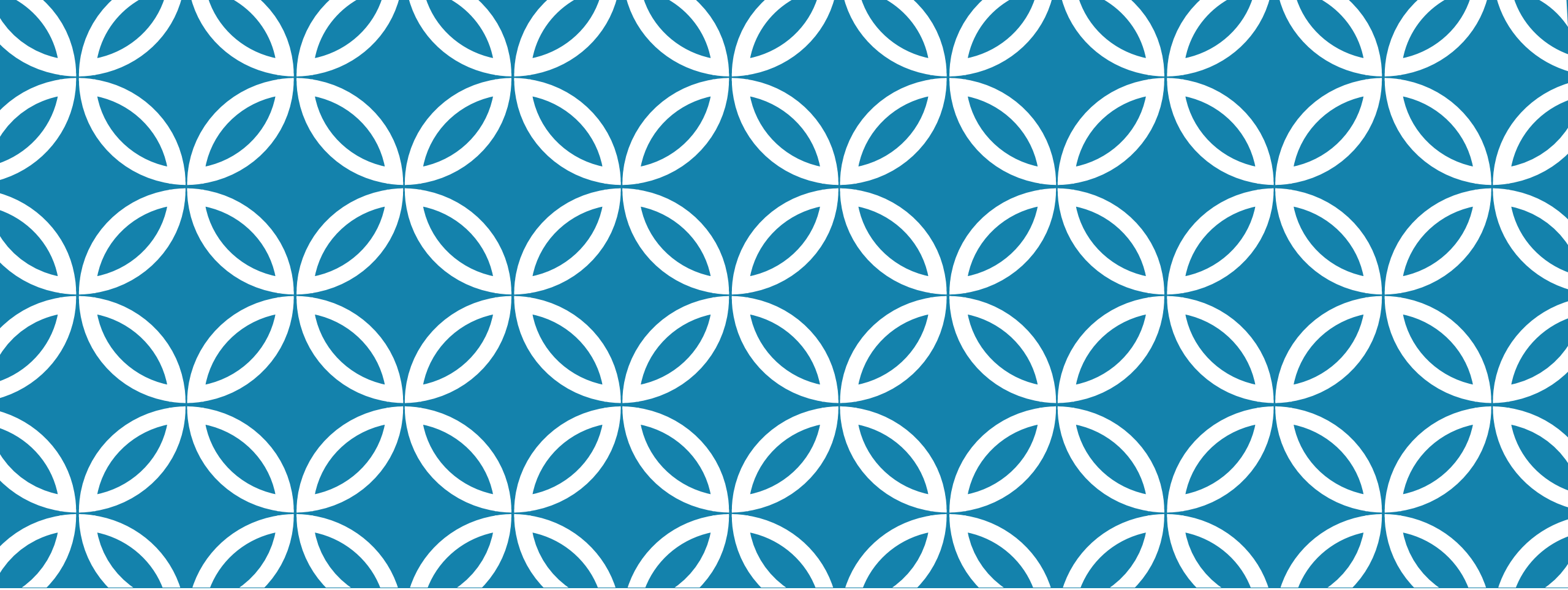
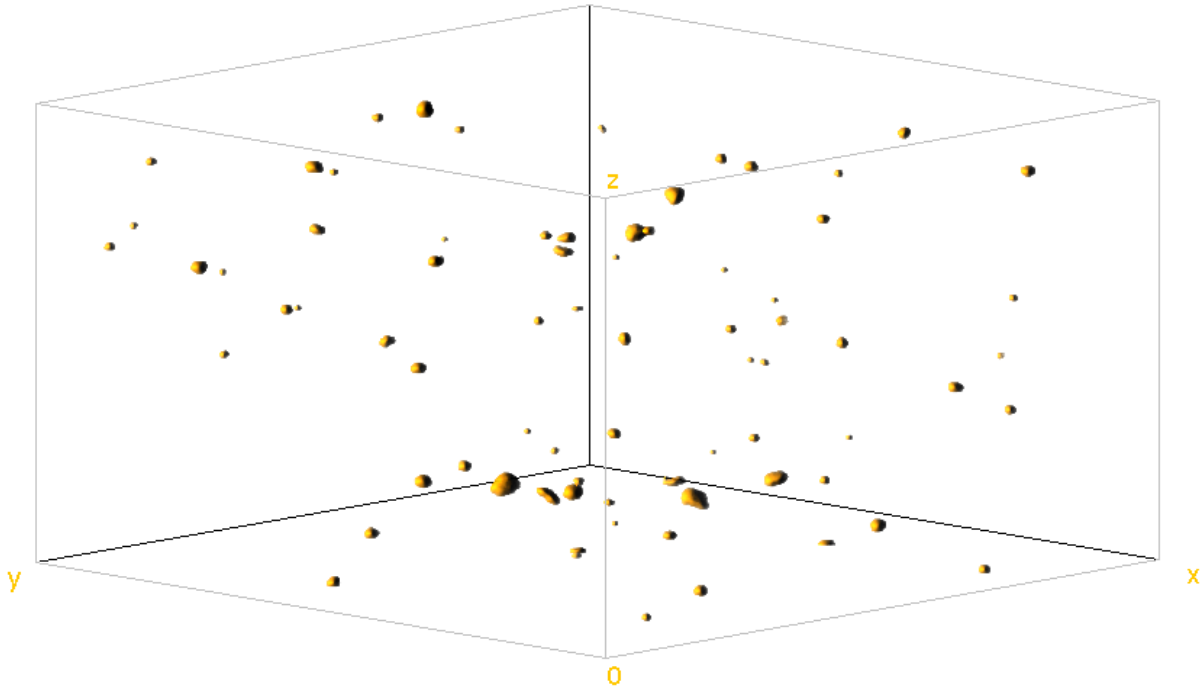


TRACKING VOID GROWTH IN MATERIAL UNDERGOING TENSILE LOADING

Diego M. Fausett

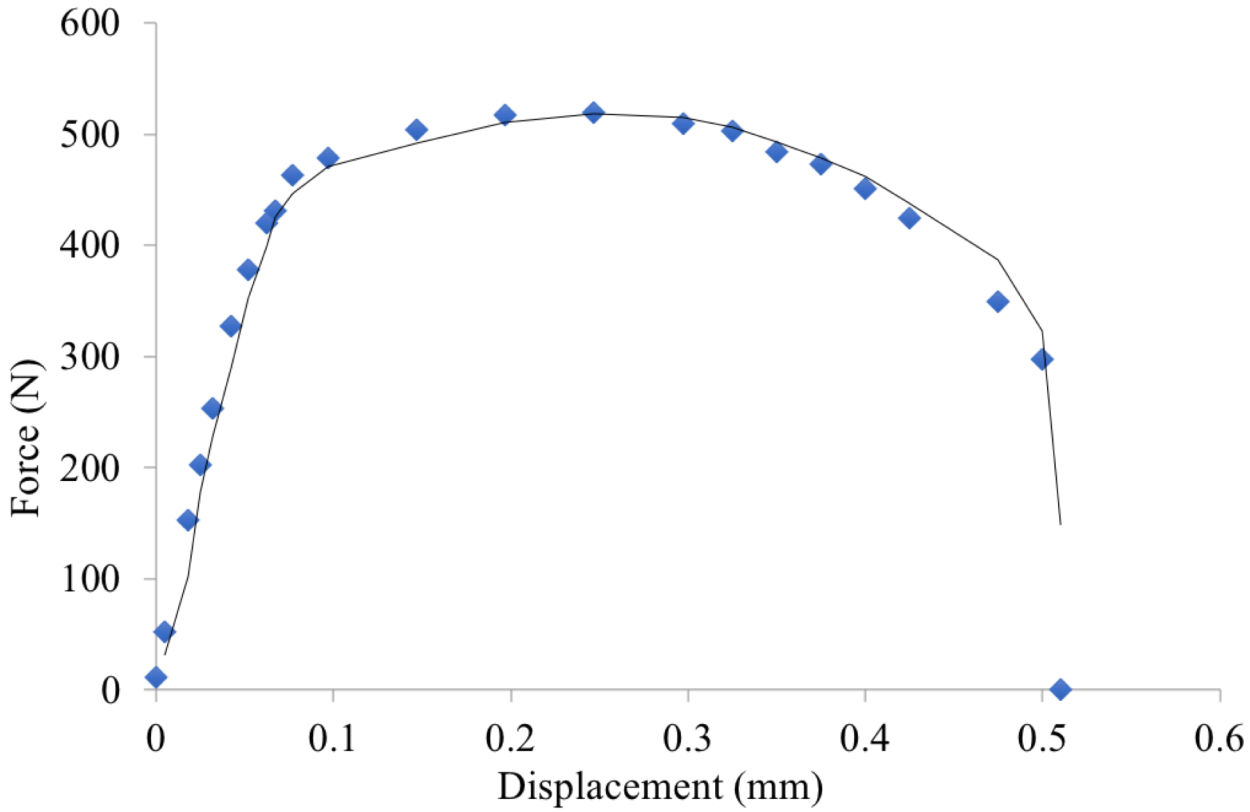
MOTIVATION



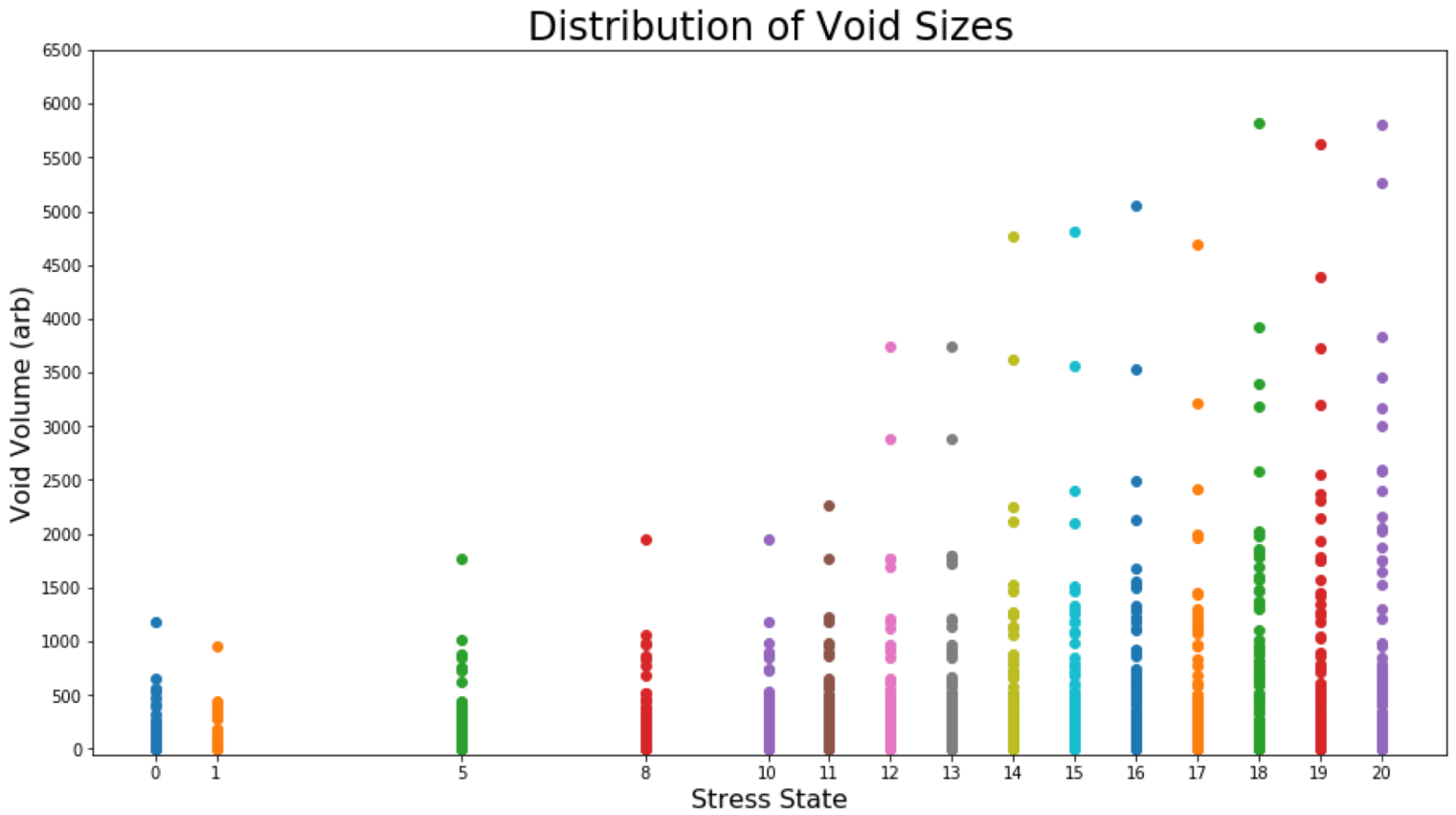
- Understand how materials behave under load, non-destructively.
  - Can be done by conducting X-ray diffraction/tomography experiments.
- Contrast in density can be probed with tomography enabling us to track microstructure (such as porosity) evolution in a single sample.
- Here, we're interested in understanding how individual voids grow under load in additively manufactured stainless steel.

FORCE VS. MATERIAL DISPLACEMENT

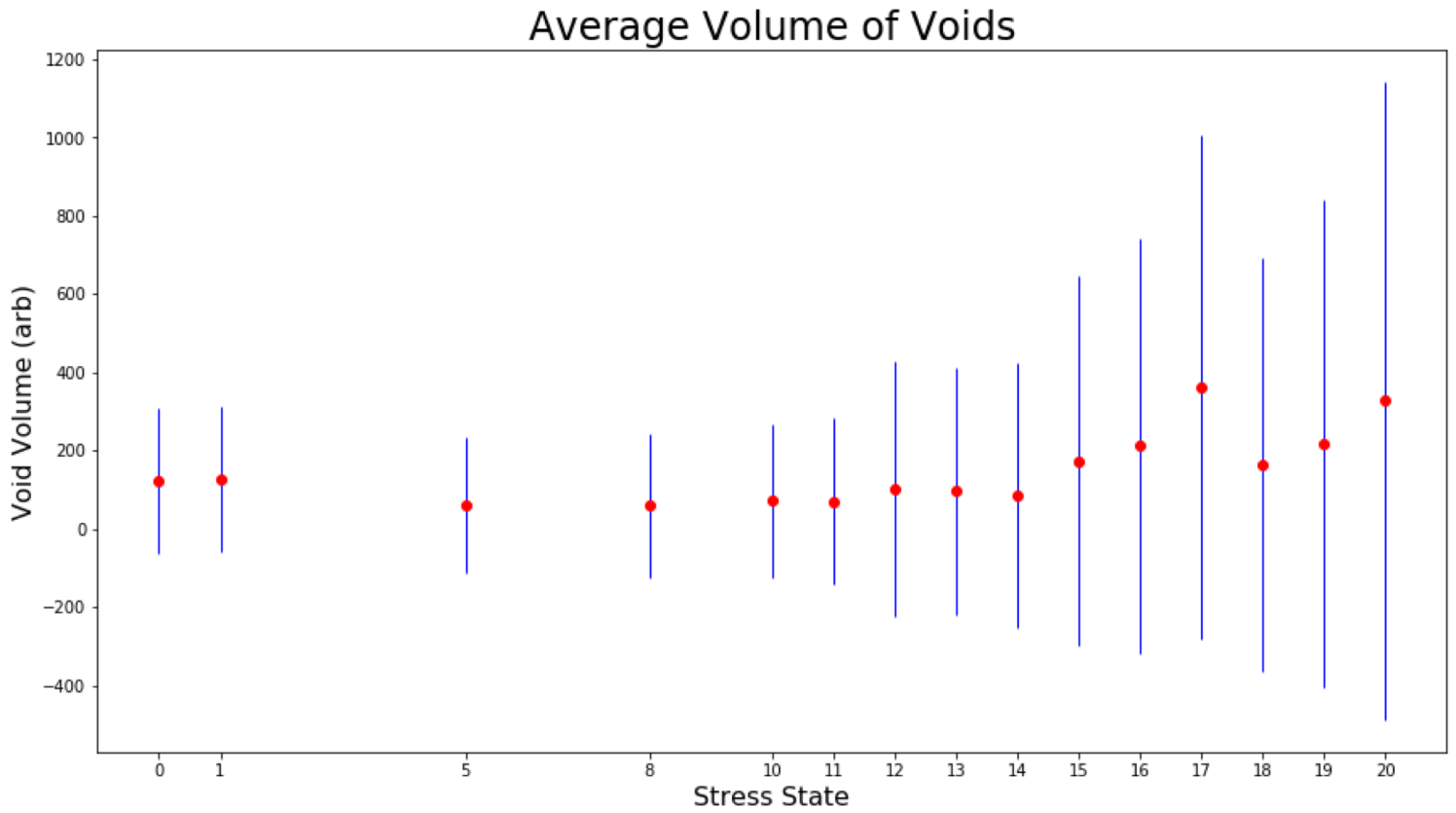
- 21 total measurements, and 15 tomography measurements, at various loads.
- The material has undergone failure at load state 21.



VOID SIZE DISTRIBUTION



AVERAGE VOID SIZE



WHAT'S NEXT?

- Determine how voids in a material nucleate, grow, and combine.
- Determine the void growth rate.
- Predict how voids will evolve in a material under a given load.